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ART UNIT	**PAPER NUMBER**
2121	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/796,946	MATZKE ET AL.
	Examiner	Art Unit
	Nathan H. Brown, Jr.	2121

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Examiner's Detailed Office Action

1. This Office is responsive to application 10/796,946, filed March 10, 2004.

2. Claims 1-46 have been examined.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claim 1 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: mathematical abstraction and/or software per se. Claims 1, 33, and 46 claim a "method for manipulating a plurality of correlithm objects". The Specification establishes "correlithm objects of an N-dimensional space, where a correlithm object is a point of the space." (*see* p. 3) or "a correlithm object may represent a point of a generalized M-dimensional sub-space S of a particular N-space, where $0 \leq M \leq N$" (*see* p. 5). Correlithm objects are clearly abstract geometric objects of an N-dimensional space. Methods for manipulating such geometric object are described in algebraic topology and other related areas of mathematics. Claim 1, therefore, recites no more than a judicial exception of mathematical abstraction, involving no physical transformation and no more than the results of mathematical transformation. Claim 1 is clearly non-statutory under 35 U.S.C. 101.

5. Claim 11 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: software per se. Claim 11 claims a "system for manipulating a plurality of correlithm objects, comprising: an overlap generator ... and a recoverer". The specification discloses a conventional hardware environment:

> "Processor 114 may comprise, for example, a personal computer, work station, network computer, wireless telephone, personal digital assistant, one or more microprocessors, other suitable processing device, or any combination of the preceding. "Memory" refers to any structure operable to store data. Memory 116 may comprise Random Access Memory (RAM), Read Only Memory (ROM), a magnetic drive, a disk drive, a Compact Disk (CD) Drive, a Digital Video Disk (DVD) drive, removable media storage, any other suitable data storage device, or a combination of the preceding."

There is no suggestion that the overlap generator or the recoverer are implemented in hardware, which implies these are software or system specification components. We may then generally consider the claimed system to be an object of manufacture. It is clearly computer related as the as it will be implemented in the disclosed hardware environment and manipulate mathematical abstractions (see above). No data structure is claimed and no functional program is indicated. Rather, two components and their purposes are disclosed. Lacking functional description language, the claim is non-statutory under 35 U.S.C. 101.

6. Claim 21 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: algorithm. Claim 21 claims a logic "for manipulating a plurality of correlithm objects". We have shown that "correlithm objects" are mathematical abstractions and that the means to manipulate them comprise mathematical transformations on N-dimensional objects. It is clear that such a "logic" must represent mathematical transformation consistent

with the properties of a plurality (set) of correlithm objects. For such a logic to be applied in a conventional computing environment (*see* above), it must be described in an unambiguous procedure, i.e., algorithm. Therefore claim 21 recites no more than a judicial exception of algorithm, which involves no physical transformation and asserts no more than the results of mathematical operations. Claim 21 is clearly non-statutory under 35 U.S.C. 101.

7. Claim 31 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: mathematical abstraction and/or algorithm. While claim 31 claims a "system for manipulating a plurality of correlithm objects, comprising: means for establishing a plurality of correlithm objects … means for imposing the plurality correlithm objects on the space … means for comparing an imposed correlithm object to the combined point; and means for recovering the imposed correlithm object …", it merely lists the means for manipulating a plurality of correlithm objects.

The Specification asserts (*see* p. 10) that:

> "Points p_i may be imposed according to any suitable technique. For example, points p_i may be imposed by performing an imposing operation such as summation on a dimension-by-dimension basis, which is equivalent to vector addition."

The Specification asserts (*see* p. 11) that:

> "An imposed point p_i may be recovered by comparing point p to the point p_i using any suitable technique. For example, an imposed point p_i may be recovered by performing a recovery operation on imposed point p_i and combined point p, such as calculating a metric such as a Cartesian distance or an inner product."

Clearly the objects manipulated by the system are mathematical abstractions and the manipulations comprise mathematical operations. Since there is no necessity to consider the

object of claim 31 to be a machine, we can generally consider such a system to be an object of manufacture and infer that its nature is computer related, as it lists a set of means for manipulating mathematical abstractions. However, no data structure is claimed and no functional program is disclosed. Lacking functional description language, the claim only recites the §101 judicial exceptions of mathematical abstraction and/or algorithm. Clam 31 is therefore non-statutory under 35 U.S.C. 101.

8. Claim 32 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: algorithm. Claim 32 claims a method for manipulating a plurality of correlithm objects, comprising: establishing a plurality of correlithm objects of a space ... imposing the plurality correlithm objects on the space to yield a combined point ... to perform at least one of: performing computation using the plurality of correlithm objects, communicating ... and storing the plurality of correlithm objects; comparing an imposed correlithm object to the combined point ... recovering the imposed correlithm object ... establishing one or more agents associated with a state space ... and assigning one or more of the plurality of correlithm objects representing a state of the agent to each agent. As shown above, correlithm objects are mathematical abstractions and imposing and recovering are well known mathematical operations. The specification asserts (*see* p. 11-12) that:

> "an agent may comprise, for example, a process in memory or a physical device. One or more agents may each have one or more unique correlithm objects that represent states for the agent, and the correlithm objects may constitute a private state machine space for the agent."

As "a process in memory or a physical device" an agent is no more than a set of instructions mapped to a set of locations in memory. Correlithm objects, assignable to agents are, as such,

constrained to be contiguous areas of memory constituting data, in this case, state data associated with the agent. However, we note that claim 32 claims a method for manipulation of these objects in memory comprising: communication, storing, and assigning. Such a method must comprise an unambiguous procedure to be implement in the conventional computing environment disclosed in the Specification. Such a procedure is commonly considered an algorithm. Therefore, claim 32 recites no more than the §101 judicial exception of algorithm and discloses no physical transformation or useful, concrete, and tangible result. Claim 32 is clearly non-statutory under 35 U.S.C. 101.

9. Claim 33 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: mathematical abstraction and/or algorithm. Claim 33 claims

> "a method for generating tokens, comprising: randomly generating a plurality of correlithm objects of a space, the space comprising an N-dimensional space, a correlithm object comprising a point of the space; and selecting one or more of the plurality of correlithm objects as one or more correlithm object tokens, the one or more correlithm object tokens being nearly orthogonal."

The specification asserts that:

> "Correlithm objects may provide for a greatly increased number of available tokens. For an N-dimensional space, only N precisely orthogonal tokens exist. Random correlithm objects, however, may be readily generated to produce nearly orthogonal tokens. Techniques may be implemented to select random correlithm objects that produce nearly orthogonal tokens with a narrower standard deviation of inner angle." (*see* p. 12), or

> "a correlithm object token may comprise a correlithm object that has D bits represented by N cells" (*see* p. 14),

Clearly a correlithm object and a correlithm object token are mathematical abstractions (N-dimensional vectors) and the method for generating such tokens must comprise an unambiguous mathematical procedure or algorithm. Claim 33 recites no more than the §101 judicial exceptions of mathematical abstraction and algorithm. Claim 33 discloses no physical

transformation or useful, concrete, and tangible result. Claim 33 is non-statutory under 35 U.S.C. 101.

10. Claim 37 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: algorithm. Claim 37 claims a system for generating tokens, comprising: a memory operable to store information; and a processor coupled to the memory and operable to: randomly generate a plurality of correlithm objects of a space … etc. Claim 37 discloses a memory and a processor for the system claimed, but no I/O component. Claim 37 may thus be considered to claim a machine, which includes hardware comprising a memory and processor operable to perform the §101 judicial exception of mathematical operations on abstract objects. Since the system claimed provides on I/O means, no physical transformation in the real world and no production of useful, concrete, and tangible results is possible. Such a system clearly has not practical application and is therefore non-statutory under 35 U.S.C. 101.

11. Claim 41 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: algorithm. Claim 41 claims "a Logic for generating tokens, the logic embodied in a medium and operable to: randomly generate a plurality of correlithm objects of a space …". It has been shown that "correlithm object tokens" are mathematical abstractions and that the means to manipulate (e.g., generate) them comprise mathematical operations on N-dimensional objects. It is clear that such a "logic" is a mathematical expression of the conditions

that must be consistent for the generation of correlithm object tokens and that if such a "logic" is to be embodied in a medium and operable it must be implemented as instructions expressing an unambiguous procedure, i.e., algorithm. If such a "logic" is considered as a process (or at least to represent one), it is clearly recites no more than a §101 judicial exception of mathematical abstraction which involves no physical transformation and asserts no more than the results of mathematical operations. Claim 41 is clearly non-statutory under 35 U.S.C. 101.

12. Claim 45 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: algorithm. Claim 45 claims a system for generating tokens, comprising: means for randomly generating a plurality of correlithm objects of a space, the space comprising an N-dimensional space, a correlithm object comprising a point of the space; and means for selecting one or more of the plurality of correlithm objects as one or more correlithm object tokens, the one or more correlithm object tokens being nearly orthogonal. It will be noted that the claimed system provides for no input or output of results and thus recites no more than a §101 judicial exception of mathematical algorithm, which involves no physical transformation and asserts no more than the results of mathematical operations. Claim 41 is clearly non-statutory under 35 U.S.C. 101.

13. Claim 46 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: algorithm. Claim 46 claims

> "a method for generating tokens, comprising: randomly generating a plurality of correlithm objects of a space ... selecting one or more of the plurality of correlithm objects as one or more correlithm object tokens ... by establishing a distance threshold associated with a standard metric ... selecting the one or more correlithm objects that satisfy the distance threshold as the one or more correlithm object tokens ... selecting a correlithm object of the plurality of correlithm objects ... generating a token complement of the selected correlithm object ... and using the token complement as a correlithm object token."

It has been shown that "correlithm objects" and "correlithm object tokens" are mathematical abstractions and that the means to generate and manipulate them comprise mathematical operations on N-dimensional objects. The specification asserts (*see* p. 2) that

> "Tokens may be used to provide interaction for agents in a shared resource such as a shared state space..."

and discloses (see Fig. 3 and p. 4):

> "one embodiment of a system for imposing and recovering correlithm objects used as correlithm object tokens"

Examiner interprets a token to be data passed between agents. Now, claim 46 claims a method for generating tokens comprising a number of steps, which clearly comprise an algorithm. As claim 46 recites no more than a §101 judicial exception of mathematical algorithm which involves no physical transformations and generates no output that can act as a useful, concrete, and tangible result, claim 46 is non-statutory under 35 U.S.C. 101.

14. Claims 2-10 are non-statutory under 35 U.S.C. 101 for the same reason as claim 1. Claims 12-20 are non-statutory under 35 U.S.C. 101 for the same reason as claim 11. Claims 22-30 are non-statutory under 35 U.S.C. 101 for the same reason as claim 21. Claims 32-30 are non-statutory under 35 U.S.C. 101 for the same reason as claim 31. Claims 34-36 are non-statutory under 35 U.S.C. 101 for the same reason as claim 33. Claims 38-40 are non-statutory under 35

U.S.C. 101 for the same reason as claim 37. Claims 42-44 are non-statutory under 35 U.S.C. 101 for the same reason as claim 41.

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

16. Claims 1-3, 5, 7-11, 14, 15, 17, 21-23, 25, 27, 28, and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Sutherland (USPN 5,515,477).

Regarding claim 1. Sutherland teaches a method for manipulating a plurality of correlithm objects (*see* col. 6, line 62 to col. 7, line 46, *Examiner interprets a "complex valued vector phase difference set" to be a plurality of correlithm objects.*), comprising: establishing a plurality of correlithm objects of a space, the space comprising an N-dimensional space, a correlithm object comprising a point of the space (*see* col. 10, line 65 to col. 11, line 28, *Examiner interprets '(s1,s2,s3, ... ,s"n")', where* $s_k \rightarrow \lambda_k e^{\omega}{}_k$, *to be one of a plurality of correlithm objects of a space n. Examiner asserts that an n-dimensional vector is a point of an n-dimensional space.*);

imposing the plurality correlithm objects on the space to yield a combined point (*see* col. 19, lines 38-41, *Examiner interprets enfolding "into the correlation set via a complex vector addition" to be imposing (see Specification, p. 10) and the resulting complex vector sum to be a combined point in the column space of "[X]".*); comparing an imposed correlithm object to the combined point; and recovering the imposed correlithm object in accordance with the comparison (*see* col. 20, lines 6-25, *Examiner interprets the inner product of the "decoding transform" to be comparing an imposed correlithm object in the column space of "[X]" to the combined point "[S]*"; and recovering the imposed correlithm object "[R]" ("the associated response") in accordance with the comparison (see Specification p. 11).*).

Regarding claim 11. Sutherland teaches a system for manipulating a plurality of correlithm objects (*see* Abstract, *Examiner interprets an "input" and a "learned response" transformed to complex polar value vectors to be correlithm objects.*), comprising: an overlap generator operable to: establish a plurality of correlithm objects of a space, the space comprising an N-dimensional space, a correlithm object comprising a point of the space (*see* col. 6, lines 12-13 and col. 10, line 65 to col. 11, line 28, *Examiner interprets the "input terminal" to be an overlap generator.*); and impose the plurality correlithm objects on the space to yield a combined point (*see* col. 19, lines 38-41, *Examiner interprets enfolding "into the correlation set via a complex vector addition" to be imposing (see Specification, p. 10) and the resulting complex vector sum to be a combined point in the column space of "[X]".*); and a recoverer coupled to the overlap generator (*see* col. 6, lines 30-36, *Examiner interprets one of "a number of sub-processors that are relegated specific tasks" to be a recoverer.*) and operable to: compare an imposed correlithm

object to the combined point; and recover the imposed correlithm object in accordance with the comparison (*see* col. 20, lines 6-25, *Examiner interprets the inner product of the "decoding transform" to be comparing an imposed correlithm object in the column space of "[X]" to the combined point "[S]*"; and recovering the imposed correlithm object "[R]" ("the associated response") in accordance with the comparison (see Specification p. 11).*).

Regarding claim 21. Sutherland teaches logic for manipulating a plurality of correlithm objects (*see* col. 6, line 39 to col. 7, line 46, *Examiner interprets the "learning (encoding) operation" to be a logic for manipulating a plurality of correlithm objects.*), the logic embodied in a medium and operable (*see* col. 6, lines 30-38, *Examiner interprets the "processor" to comprise a memory device which acts as an operable medium for embodiment of logic.*) to: establish a plurality of correlithm objects of a space, the space comprising an N-dimensional space, a correlithm object comprising a point of the space (*see* col. 6, lines 12-13 and col. 10, line 65 to col. 11, line 3, *Examiner interprets '(s1,s2,s3, ... ,s"n")', where* $s_k \rightarrow \lambda_k e^{\omega}{}_k$, *to be one of a plurality of correlithm objects of a space n input during "learning (encoding)" operations. Examiner notes that an n-dimensional vector is a point of an n-dimensional space.*); impose the plurality correlithm objects on the space to yield a combined point (*see* col. 19, lines 38-41, *Examiner interprets enfolding "into the correlation set via a complex vector addition" to be imposing (see Specification, p. 10) and the resulting complex vector sum to be a combined point in the column space of "[X]".*); compare an imposed correlithm object to the combined point; and recover the imposed correlithm object in accordance with the comparison (*see* col. 20, lines 6-25, *Examiner interprets the inner product of the "decoding transform" to be comparing an*

imposed correlithm object in the column space of "[X]" to the combined point "[S]"; and recovering the imposed correlithm object "[R]" ("the associated response") in accordance with the comparison (see Specification p. 11).*).

Regarding claim 31. *Sutherland* teaches a system for manipulating a plurality of correlithm objects (*see col. 6, lines 11-15 and col. 6, lines 30-36*), comprising: means for establishing a plurality of correlithm objects of a space, the space comprising an N-dimensional space, a correlithm object comprising a point of the space (*see* col. 10, line 65 to col. 11, line 28, *Examiner interprets '(s1,s2,s3, ... ,s"n")', where* $s_k \rightarrow \lambda_k e^{\omega}{}_k$*, to be one of a plurality of correlithm objects of a space n. Examiner asserts that an n-dimensional vector is a point of an n-dimensional space.*); means for imposing the plurality correlithm objects on the space to yield a combined point (*see* col. 6, lines 30-36, *Examiner interprets one of "a number of sub-processors that are relegated specific tasks" to be a means for performing complex vector addition resulting in a combined point (see above).*); means for comparing an imposed correlithm object to the combined point; and means for recovering the imposed correlithm object in accordance with the comparison (*see* col. 6, lines 30-36 and col. 20, lines 6-17, *Examiner interprets one of "a number of sub-processors that are relegated specific tasks" to be a means for performing the inner product of the "decoding transform" resulting recovering the imposed correlithm object in accordance with the comparison (see above).*).

Regarding claim 2. *Sutherland* teaches the method of manipulating a plurality of correlithm objects, further comprising randomly generating the plurality of correlithm objects (*see* col. 20,

lines 35-37, *Examiner interprets "constructing sets of complex vectors of random orientation" to be establishing a plurality of correlithm objects of a space, the plurality of correlithm objects being randomly generated.*).

Regarding claim 3. *Sutherland* teaches the method of manipulating a plurality of correlithm objects, wherein imposing the plurality correlithm objects on the space to yield the combined point further comprises performing an imposing operation on the plurality of correlithm objects (*see* col. 19, lines 38-41, *Examiner interprets enfolding "into the correlation set via a complex vector addition" to be imposing (see Specification, p. 10) and the resulting complex vector sum to be a first combined point of the space. Examiner further asserts that the first combined point of the space can be imposed on any other correlithm objects of the space by complex vector addition to form a further combined point. Examiner asserts that all of the correlithm objects of the space may be combined in this fashion.*).

Regarding claim 5. *Sutherland* teaches the method of manipulating a plurality of correlithm objects, further comprising: establishing one or more agents, each agent associated with a state space (*see* col. 41, lines 44-56, *Examiner interprets a "holographic neural cell" to be an agent.*); and assigning one or more of the plurality of correlithm objects to each agent, the one or more correlithm objects representing a state of the agent to which the one or more correlithm objects are assigned (*see* col. 41, lines 45-53, *Examiner interprets "stimulus-response mappings" to be one or more of a plurality of correlithm objects representing a state of the agent.*).

Regarding claim 7. *Sutherland* teaches the method of claim 1, further comprising utilizing a

correlithm object of the plurality of correlithm objects as a correlithm object token (*see* col. 6, lines 41-45, *Examiner interprets a stimulus/response vectors to be a correlithm object tokens.*).

Regarding claim 8. *Sutherland* teaches the method of manipulating a plurality of correlithm objects, wherein imposing the plurality correlithm objects on the space to yield the combined point further comprises performing computation using the plurality of correlithm objects (*see* col. 7, line 47 to col. 8, line 22, *Examiner interprets "the response recall function" to be computation using the plurality of correlithm objects.*).

Regarding claim 9. *Sutherland* teaches the method of manipulating a plurality of correlithm objects, wherein imposing the plurality correlithm objects on the space to yield the combined point further comprises storing the plurality of correlithm objects (*see* col. 38, lines 52-56, *Examiner interprets "the external memory means providing facility for memory mapped input" to be used for storing the plurality of input correlithm objects.*).

Regarding claim 10. *Sutherland* teaches the method of manipulating a plurality of correlithm objects, wherein imposing the plurality correlithm objects on the space to yield the combined point further comprises communicating the plurality of correlithm objects (*see* col. 8, lines 23-27, *Examiner interprets "receiving and propagating the at least one associated response vector" to mean that communicating the plurality of correlithm objects is possible.*).

Regarding claim 12. *Sutherland* teaches the system of manipulating a plurality of correlithm objects, further comprising a processor coupled to the overlap generator and operable to randomly generate the plurality of correlithm objects (*see* col. 6, lines 30-36, *Examiner interprets one of "a number of sub-processors that are relegated specific tasks" to be relegated to the task*

of randomly generating a plurality of correlithm objects of a space. Examiner interprets the "input terminal" to be an overlap generator.).

Regarding claim 14. The system of manipulating a plurality of correlithm objects, the recoverer operable to compare the imposed correlithm object to the combined point by performing a recovery operation on the imposed correlithm object and the combined point (*see* col. 20, lines 6-25, *Examiner interprets the inner product of the "decoding transform" to be comparing an imposed correlithm object in the column space of "[X]" to the combined point "[S]*"; and recovering the imposed correlithm object "[R]" ("the associated response") in accordance with the comparison (see Specification p. 11).*).

Regarding claim 15. *Sutherland* teaches the system of manipulating a plurality of correlithm objects, further comprising a processor coupled to the overlap generator and operable to: establish one or more agents, each agent associated with a state space; and assign one or more of the plurality of correlithm objects to each agent, the one or more correlithm objects representing a state of the agent to which the one or more correlithm objects are assigned (*see* col. 6, lines 30-36, *Examiner interprets one of "a number of sub-processors that are relegated specific tasks" to be relegated to the tasks of: establishing one or more agents and assigning one or more of the plurality of correlithm objects to each agent.*).

Regarding claim 17. *Sutherland* teaches the system of manipulating a plurality of correlithm objects, further comprising a processor coupled to the overlap generator and operable to utilize a correlithm object of the plurality of correlithm objects as a correlithm object token (*see* col. 6,

lines 30-36, *Examiner interprets one of "a number of sub-processors that are relegated specific tasks" to operable to utilize a correlithm object of the plurality of correlithm objects as a correlithm object token.*).

Regarding claim 22. *Sutherland* teaches the logic of manipulating a plurality of correlithm objects, further operable to randomly generate the plurality of correlithm objects (*see* col. 20, lines 35-37, *Examiner interprets "constructing sets of complex vectors of random orientation" to comprise logic for establishing a plurality of correlithm objects of a space, the plurality of correlithm objects being randomly generated.*).

Regarding claim 23. *Sutherland* teaches the logic of manipulating a plurality of correlithm objects, operable to impose the plurality correlithm objects on the space to yield the combined point by performing an imposing operation on the plurality of correlithm objects (*see* col. 19, lines 38-41, *Examiner interprets "complex vector addition" to be imposing (see Specification, p. 10) and the resulting vector sum to be a combined point.*).

Regarding claim 25. *Sutherland* teaches the logic of manipulating a plurality of correlithm objects, further operable to: establish one or more agents, each agent associated with a state space (*see* col. 41, lines 44-56, *Examiner interprets a "holographic neural cell" to be an agent.*); and assign one or more of the plurality of correlithm objects to each agent, the one or more correlithm objects representing a state of the agent to which the one or more correlithm objects are assigned (*see* col. 41, lines 45-53, *Examiner interprets the set of "stimulus-response mappings" to consist one or more of a plurality of correlithm objects representing a state of the*

agent.).

Regarding claim 27. *Sutherland* teaches the logic of manipulating a plurality of correlithm objects, further operable to utilize a correlithm object of the plurality of correlithm objects as a correlithm object token (*see* col. 6, lines 41-45, *Examiner interprets a stimulus vector to be a correlithm object of the plurality of correlithm objects and a a correlithm object token. Examiner interprets a response vector a to be a correlithm object of the plurality of correlithm objects and a a correlithm object token.*).

Regarding claim 28. *Sutherland* teaches the logic of manipulating a plurality of correlithm objects, operable to impose the plurality correlithm objects on the space to yield the combined point by performing computation using the plurality of correlithm objects (*see* col. 19, lines 38-41, *Examiner interprets enfolding "into the correlation set via a complex vector addition" to be imposing (see Specification, p. 10) and the resulting complex vector sum to be a first combined point of the space. Examiner further asserts that the first combined point of the space can be imposed on any other correlithm objects of the space by complex vector addition to form a further combined point. Examiner asserts that all of the correlithm objects of the space may be combined in this fashion.*).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 6, 16, 26, 32, 33, 37, 41, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Sutherland* in view of *Caid et al.* (USPN 6,173,275).

Regarding claims 6, 16, and 26. *Sutherland* teaches the method, system, and logic, respectively , for manipulating a plurality of correlithm objects (*see* above).

Regarding claim 32. *Sutherland* teaches a method for manipulating a plurality of correlithm objects, comprising: establishing a plurality of correlithm objects of a space, the space comprising an N-dimensional space, a correlithm object comprising a point of the space, the plurality of correlithm objects being randomly generated (*see* col. 20, lines 35-37, *Examiner interprets "constructing sets of complex vectors of random orientation" to be establishing a plurality of correlithm objects of a space, the plurality of correlithm objects being randomly generated.*), a correlithm object of the plurality of correlithm objects being utilized as a correlithm object token (*see* col. 6, lines 41-45, *Examiner interprets a stimulus/response vector pair to be a correlithm object token.*); imposing the plurality correlithm objects on the space to yield a combined point by performing an imposing operation on the plurality of correlithm objects (*see* col. 19, lines 38-41, *Examiner interprets "complex vector addition" to be imposing (see Specification, p. 10) and the resulting vector sum to be a combined point.*), the plurality correlithm objects imposed to perform at least one of: performing computation using the

plurality of correlithm objects (*see* col. 7, line 47 to col. 8, line 22, *Examiner interprets "the response recall function" to be computation using the plurality of correlithm objects.*), communicating the plurality of correlithm objects (*see* col. 8, lines 23-27, *Examiner interprets "receiving and propagating the at least one associated response vector" to mean that communicating the plurality of correlithm objects is possible.*), and storing the plurality of correlithm objects (*see* col. 38, lines 52-56, *Examiner interprets "the external memory means providing facility for memory mapped input" to be used for storing the plurality of input correlithm objects.*); comparing an imposed correlithm object to the combined point by performing a recovery operation on the imposed correlithm object and the combined point; recovering the imposed correlithm object in accordance with the comparison (*see* col. 20, lines 6-17, *Examiner interprets the inner product of the "decoding transform" to be comparing an imposed correlithm object "[X]" to the combined point "[S]*"; and recovering the imposed correlithm object [R] ("the associated response") in accordance with the comparison (see Specification p. 11).*); establishing one or more agents, each agent associated with a state space (*see* col. 41, lines 44-56, *Examiner interprets a "holographic neural cell" to be an agent.*); and assigning one or more of the plurality of correlithm objects to each agent, the one or more correlithm objects representing a state of the agent to which the one or more correlithm objects are assigned (*see* col. 41, lines 45-53, *Examiner interprets the set of "stimulus-response mappings" to consist one or more of a plurality of correlithm objects representing a state of the agent.*).

Regarding claim 33. *Sutherland* teaches a method for generating tokens (*see* col. 6, lines 41-45, *Examiner interprets a stimulus/response vector pair to be a correlithm object token.*),

comprising: randomly generating a plurality of correlithm objects of a space, the space comprising an N-dimensional space, a correlithm object comprising a point of the space (*see* col. 20, lines 35-37, *Examiner interprets "constructing sets of complex vectors of random orientation" to be establishing a plurality of correlithm objects of a space, the plurality of correlithm objects being randomly generated.*); and selecting one or more of the plurality of correlithm objects as one or more correlithm object tokens (*see* col. 1, lines 14-17, *Examiner interprets "the introduction of a stimulus pattern results in the recall of a memory associated response" to mean that the input of a correlithm object representing "a stimulus pattern" results in the selection of a correlithm object representing an "associated response", stored in the associative memory.*).

Regarding claim 37. *Sutherland* teaches a system for generating tokens, comprising: a memory operable to store information (*see* col. 6, lines 30-33); and a processor coupled to the memory and operable to: randomly generate a plurality of correlithm objects of a space, the space comprising an N-dimensional space, a correlithm object comprising a point of the space (*see* col. 6, lines 30-36, *Examiner interprets one of "a number of sub-processors that are relegated specific tasks" to be relegated to the task of randomly generating a plurality of correlithm objects of a space.*); and select one or more of the plurality of correlithm objects as one or more correlithm object tokens (*see* above, *Examiner interprets one of "a number of sub-processors that are relegated specific tasks" to be relegated to the task of selecting one or more of the plurality of correlithm objects as one or more correlithm object tokens.*).

Regarding claim 41. *Sutherland* teaches logic for generating tokens (*see* col. 6, line 39 to col. 7, line 46, *Examiner interprets "operation associated with a single neural element" to "receive the*

above mentioned input values in an associated pair of sets comprising a stimulus set having a plurality of stimulus values, and a response set comprising a single value for a response corresponding to those stimuli values".), the logic embodied in a medium and operable (*see* col. 6, lines 30-38, *Examiner interprets the "processor" to comprise a memory device which acts as an operable medium for embodiment of logic.*) to: randomly generate a plurality of correlithm objects of a space, the space comprising an N-dimensional space, a correlithm object comprising a point of the space (*see* col. 20, lines 35-37, *Examiner interprets "constructing sets of complex vectors of random orientation" to be establishing a plurality of correlithm objects of a space, the plurality of correlithm objects being randomly generated.*); and select one or more of the plurality of correlithm objects as one or more correlithm object tokens (*see* col. 1, lines 14-17, *Examiner interprets "the introduction of a stimulus pattern results in the recall of a memory associated response" to mean that the input of a correlithm object representing "a stimulus pattern" results in the selection of a correlithm object representing an "associated response", stored in the associative memory.*).

Regarding claim 45. *Sutherland* teaches a system for generating tokens, comprising: means for randomly generating a plurality of correlithm objects of a space, the space comprising an N-dimensional space, a correlithm object comprising a point of the space (*see* above); and means for selecting one or more of the plurality of correlithm objects as one or more correlithm object tokens (*see* above).

Sutherland does not teach the plurality of correlithm objects being nearly orthogonal or the one or more correlithm object tokens being nearly orthogonal for claims 6, 16, 26, 32, 33, 37, 41, and 45. However, *Caid et al.* do teach the plurality of correlithm objects being nearly orthogonal

(*see* col. 8, lines 17-29, *Examiner interprets a "context vectors" to be a correlithm object.*) or the one or more correlithm object tokens being nearly orthogonal (*see* col. 8, lines 17-29, *Examiner interprets a pair of "context vectors" to be a correlithm object token.*).

It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Sutherland* with *Caid et al.* as a way to initialize the system with a high dimensional correlithm object space using a random Gaussian distribution which results in nearly orthogonal correlithm objects (indicating no initial relationship between correlithm object tokens).

8. Claims 35 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Sutherland* in view of *Panwar et al.* (USPN 5,880,978).

Regarding claims 35 and 43. *Sutherland* teaches the method of generating tokens, further comprising: selecting a correlithm object of the plurality of correlithm objects (*see* col. 7, line 47 to col. 8, line 22, *Examiner interprets "the response recall" selecting a correlithm object of the plurality of correlithm objects stored in the associative memory.*). *Sutherland* does not teach generating a token complement of the selected correlithm object; and using the token complement as a correlithm object token. However, *Panwar et al.* does teach generating a token complement of the selected correlithm object (*see* Abstract, *Examiner interprets vector Y(n-1:0) to be a token complement of the selected correlithm object correlithm object X(n-1:0).*); and using the token complement as a correlithm object token (*see* Abstract, *Examiner interprets output vector Z(n-1:0) to be created using the vectors Y(n-1:0) and X(n-1:0). Examiner*

interprets Z, Y, and X to be correlithm object tokens.). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Sutherland* with *Panwar et al.* as a way to or rapidly finding the first 1 in a long vector.

9. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sutherland in view of *Caid et al.* (USPN 6,173,275) and further in view of *Panwar et al.*

Regarding claim 46. Sutherland teaches a method for generating tokens, comprising: randomly generating a plurality of correlithm objects of a space, the space comprising an N-dimensional space, a correlithm object comprising a point of the space (*see* col. 20, lines 35-37, *Examiner interprets "constructing sets of complex vectors of random orientation" to be establishing a plurality of correlithm objects of a space, the plurality of correlithm objects being randomly generated.*), the plurality of correlithm objects generated by randomly selecting one or more values for one or more entries of the random correlithm object (*see* col. 11, lines 3-10, *Examiner interprets "selected from a probabilistically-relative range, to each of respective ones of the phase coefficient values" to mean randomly selecting one or more values for one or more entries of the random correlithm object.*); selecting one or more of the plurality of correlithm objects as one or more correlithm object tokens (*see* col. 1, lines 14-17, *Examiner interprets "the introduction of a stimulus pattern results in the recall of a memory associated response" to mean that the input of a correlithm object representing "a stimulus pattern" results in the selection of a correlithm object token representing an "associated response", stored in the associative*

memory.), the one or more of the plurality of correlithm objects selected by: establishing a distance threshold associated with a standard metric of the plurality of correlithm objects (*see* col. 27, line 61 to col. 28, line 1, *Examiner interprets "dissimilar regions within the stimulus field" to comprise a distance threshold associated with a standard metric of the plurality of correlithm objects.*); and selecting the one or more correlithm objects that satisfy the distance threshold as the one or more correlithm object tokens (*see* col. 28, lines 8-12, *Examiner interprets the mapping of any correlithm object in "regions in the stimulus fields which are isometric however mapped to separate or distinct response values" to select one or more correlithm objects (in the domain of the function) paired with correlithm objects representing "separate or distinct response values" (in the codomain of the function). Examiner interprets the correlithm objects in the set representing the function as correlithm object tokens.*); selecting a correlithm object of the plurality of correlithm objects (*see* above).

Sutherland does not teach the plurality of correlithm objects being nearly orthogonal or the one or more correlithm object tokens being nearly orthogonal. However, *Caid et al.* do teach the plurality of correlithm objects being nearly orthogonal (*see* col. 8, lines 17-29, *Examiner interprets a "context vectors" to be a correlithm object.*) or the one or more correlithm object tokens being nearly orthogonal (*see* col. 8, lines 17-29, *Examiner interprets a pair of "context vectors" to be a correlithm object token.*). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Sutherland* with *Caid et al.* as a way to initialize the system with a high dimensional correlithm object space using a random

Gaussian distribution which results in nearly orthogonal correlithm objects (indicating no initial relationship between correlithm object tokens).

Neither *Sutherland nor Caid et al.* teach generating a token complement of the selected correlithm object and using the token complement as a correlithm object token. However, *Panwar et al.* do teach generating a token complement of the selected correlithm object (*see* Abstract, *Examiner interprets vector Y(n-1:0) to be a complement of the selected correlithm object X(n-1:0).*) and using the token complement as a correlithm object token (*see* Abstract, *Examiner interprets the vector pair Y(n-1:0) and X(n-1:0) to be correlithm objects forming a token.*). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Sutherland* and *Caid et al.* with *Panwar et al.* as a way to or rapidly finding the first 1 in a long vector.

10. Claims 34, 36, 38-40, 42, and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sutherland.

Regarding claim 34. *Sutherland* teaches the method of generating tokens, wherein randomly generating the plurality of correlithm objects of the space further comprises generating a random correlithm object by randomly selecting one or more values for one or more entries of the random correlithm object (*see* col. 11, lines 3-10, *Examiner interprets "selected from a probabilistically-relative range, to each of respective ones of the phase coefficient values" to mean randomly selecting one or more values for one or more entries of the random correlithm object.*).

Regarding claim 36. *Sutherland* teaches the method of generating tokens, wherein selecting the one or more of the plurality of correlithm objects as the one or more correlithm object tokens further comprises: establishing a distance threshold associated with a standard metric of the plurality of correlithm objects (*see* col. 27, line 61 to col. 28, line 1, *Examiner interprets "dissimilar regions within the stimulus field" to comprise a distance threshold associated with a standard metric of the plurality of correlithm objects.*); and selecting the one or more correlithm objects that satisfy the distance threshold as the one or more correlithm object tokens(*see* col. 28, lines 8-12, *Examiner interprets the mapping of any correlithm object in "regions in the stimulus fields which are isometric however mapped to separate or distinct response values" to select one or more correlithm objects (in the domain of the function) paired with correlithm objects representing "separate or distinct response values" (in the codomain of the function). Examiner interprets the correlithm objects in the set representing the function as correlithm object tokens.*).

Regarding claim 38. *Sutherland* teaches the system of generating tokens, the processor operable to randomly generate the plurality of correlithm objects of the space by generating a random correlithm object by randomly selecting one or more values for one or more entries of the random correlithm object (*see* col. 6, lines 30-36, *Examiner interprets one of "a number of sub-processors that are relegated specific tasks" to be relegated to the task of generating a random correlithm object by randomly selecting one or more values for one or more entries of the random correlithm object.*).

Regarding claim 39. *Sutherland* teaches the system of generating tokens, the processor further operable to: select a correlithm object of the plurality of correlithm objects (*see* col. 6, lines 30-

36, *Examiner interprets one of "a number of sub-processors that are relegated specific tasks" to be relegated to the task of selecting a correlithm object of the plurality of correlithm objects.*); generate a token complement of the selected correlithm object; and use the token complement as a correlithm object token (*see* col. 6, lines 30-36, *Examiner interprets one of "a number of sub-processors that are relegated specific tasks" to be relegated to the tasks of: generating a token complement of the selected correlithm object; and using the token complement as a correlithm object token.*).

Regarding claim 40. *Sutherland* teaches the system of generating tokens, the processor further operable to select the one or more of the plurality of correlithm objects as the one or more correlithm object tokens by: establishing a distance threshold associated with a standard metric of the plurality of correlithm objects (*see* col. 28, lines 8-12, *Examiner interprets the mapping of any correlithm object in "regions in the stimulus fields which are isometric however mapped to separate or distinct response values" to have a codomain which comprises a distance threshold associated with a standard metric of the plurality of correlithm objects.*); and selecting the one or more correlithm objects that satisfy the distance threshold as the one or more correlithm object tokens (*see* col. 6, lines 30-36, *Examiner interprets one of "a number of sub-processors that are relegated specific tasks" to be relegated to the tasks of: selecting the one or more of the plurality of correlithm objects as the one or more correlithm object tokens; and selecting the one or more correlithm objects that satisfy the distance threshold as the one or more correlithm object tokens.*).

Regarding claim 42. *Sutherland* teaches the logic of generating tokens, operable to randomly generate the plurality of correlithm objects of the space by generating a random correlithm object

by randomly selecting one or more values for one or more entries of the random correlithm object (*see* col. 11, lines 3-10, *Examiner interprets "selected from a probabilistically-relative range, to each of respective ones of the phase coefficient values" to mean randomly selecting one or more values for one or more entries of the random correlithm object.*).

Regarding claim 44. The logic of generating tokens, operable to select the one or more of the plurality of correlithm objects as the one or more correlithm object tokens by: establishing a distance threshold associated with a standard metric of the plurality of correlithm objects (*see* col. 27, line 61 to col. 28, line 1, *Examiner interprets "dissimilar regions within the stimulus field" to comprise a distance threshold associated with a standard metric of the plurality of correlithm objects.*); and selecting the one or more correlithm objects that satisfy the distance threshold as the one or more correlithm object tokens (*see* col. 28, lines 8-12, *Examiner interprets the mapping of any correlithm object in "regions in the stimulus fields which are isometric however mapped to separate or distinct response values" to select one or more correlithm objects (in the domain of the function) paired with correlithm objects representing "separate or distinct response values" (in the codomain of the function). Examiner interprets the correlithm objects in the set representing the function as correlithm object tokens.*).

Allowable Subject Matter

8. Claims 4, 13, 18-20, 24, 29, and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan H. Brown, Jr. whose telephone number is 571-272- 8632. The examiner can normally be reached on M-F 0830-1700. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on 571-272-3687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions

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